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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/534,475	05/10/2005	Raoul Florent	FR020121US	5009

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EXAMINER	
GUPTA, VANI	

ART UNIT	PAPER NUMBER
3768	

MAIL DATE	DELIVERY MODE
11/13/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/534,475	FLORENT ET AL.	
	Examiner	Art Unit	
	VANI GUPTA	3768	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 August 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,6-10 and 14-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6-10 and 14-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 26, 2009 has been entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. ***Claims 1 and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.***

The term "few minutes" in claims 1 and 17 is a relative term which renders the claim indefinite. The term "few minutes" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Therefore, one of ordinary skill may interpret "few minutes" to comprise a time span from anywhere less than one minute to as long as sixty minutes.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. ***Claims 1 – 4, 7, 8, 14 – 16 are rejected under 35 U.S.C. 103(a) as being unpatentable Zarkh et al. (US 2008/0247621 A1).***

Regarding claims 1 and 14, *Zarkh et al.* (hereinafter *Zarkh*) discloses a medical viewing system (**fig. 1, 100**) comprising a processing means for processing live sequence of images in real time *(pg. [0028])*.

Zarkh's processing means ***(figs. 1, 4, and 6)*** is capable of automatically detecting the guide-wire tip (pg. *[0028 – 0029])*.

With respect to "yielding a skeleton of the guide-wire tip comprising a series of pixels along the centerline of the tip," Zarkh describes a process for "enhancement of thin dark lines" of features in an image by using a "dot-enhancing filter *(pg. [0037]; **fig. 5 – block 412**)*. Zarkh also performs a "parameterization" of the image pixels relatively to centerline of a major blood vessel. Zarkh then performs a "segmentation" of the guide-wire tip by determining a center-point of the guidewire tip and associating this point with the centerline of the vessel; essentially determining a skeleton of the guide-wire. A field of motion vectors based on this skeleton is then determined to assist in detecting and tracking the guidewire-catheter device *(pg. 0043 ; see also [0033] for support)*.

Zarkh also provides a depiction of the guide-wire within a catheter, as the catheter is being snaked into a major blood vessel. This description and figure matches the depiction of the skeleton of the guide-wire tip as shown in *figs. 2A and 2B of the present invention*.

Zarkh's processing means ***(figs. 1, 4, and 6)*** is capable of automatically registering the guide-wire tip with respect to a reference based on the field of motion vectors (pg. [0042 – 0043]); and for enhancing the images of the guide-wire and the vessel walls while blurring the background in the registered images comprising ridge enhancement means and temporal integration means for averaging pixel intensity over several images for enhancing line-like structures and blurring the background *(pg. [0050 – 0051])*.

Based on the background in the disclosure of the present application (paragraph [0036]) for the feature, Examiner interprets the feature averaging pixel intensity over several images for enhancing line-like structures and blurring the background as a means for "better discriminate[ing] tubular features like vessels, from step-like features such as the boundary of a diaphragm" (Zarkh, pg. [0051]).

To elaborate: as discussed earlier, Zarkh associates image pixels of the guidewire-catheter device with the image pixels of the centerline of a vessel. This would suggest that the device moves with the vessel (as explained in paragraph [0036] of the disclosure of the present application). As is known in the art, the diaphragm of a patient, and therefore the boundary of the diaphragm, would be in constant motion due to breathing, heart-beating, etc. This is step is accomplished while considering the state of the device, vessel, and diaphragm during the course of obtaining several images *(pg. [0050])*.

Zarkh's system also comprises a means for delivering diluted contrast agent into the blood vessel over a period of a few minutes. Based on the disclosure of the present application, diluted contrast agent is different from concentrated contrast agent in that the former allows visualization of the guidewire tip. Zarkh discusses injecting "contrast material" into the body to assist in navigation of the guidewire. Therefore, it is apparent that Zarkh is injecting *diluted* contrast material as, throughout Zarkh's disclosure, the guidewire is navigated by relying on the *tip* of the guidewire *(pg. [0024] – last sentence; [0025]; **fig. 2** and [0029]).*

In light of the 35 USC 112 second paragraph rejection above and for purposes of examination, Examiner interprets Zarkh's disclosure of "using *short* injections of contrast material" (pg. [0029] – penultimate sentence) to read on this claim.

Additionally, with respect to "automatically injecting diluted contrast material," though Zarkh discloses depressing a ***"piston" (fig. 2, 222)*** - which would suggest manual means – it would be obvious to one of ordinary skill in the art to modify Zarkh, since it has been held that broadly providing an automatic means to replace manual activity to accomplish the same result involves only routine skill in the art. See *In re Venner*, 120 USPQ 192.

Zarkh's system also comprises a display means for displaying a live sequence of processed images (***display device*, fig. 1, 120**).

Regarding Claim 2, Zarkh's system comprises first means for automatically detecting guide-wire tip are comprising means for spatially extending for spatially extending the skeleton (see Claim 1); matching the current skeleton to a skeleton of reference, means for estimating the matching motion and means for extrapolating this matching motion to a full region of interest (ROI) *(paragraphs [0032 – 0037]).*

Regarding Claim 3, Zarkh discloses processing means **(fig. 1, 110)** further comprising selecting means for selecting a Region Of Interest in the sequence of images comprising the guide-wire tip, and processing the data in said ROI *(paragraph [0028], second half: "processor is preferably a computing platform…")*.

Regarding Claim 4, control means for a user to activate, to control the duration or to stop the processing means applied to the sequence of images in connection to a selected instant of the sequence, comprising starting means and stopping means for the user to activate or stop, at said selected instant, the processing means applied to the sequence of images for improving the visibility of the selected ROI *(paragraph [0032 – 0033])*.

Regarding claims 7 and 8, Zarkh discloses registering means for further registering a live sequence of processed images with respect to a sequence of corresponding images called oer-interventional, in order to form a new live sequence (R'(t)) on which the features of the peri-interventional images are superimposed (pgs. [0029], [0032], [0037 – 0041]; ***fig. 4***).

Regarding claims 15 and 16, please refer to rejection of claims 1 – 4 and 7 – 8 and paragraph [0028].

2. ***Claim 6 is rejected under 35 USC 103(a) as being obvious over Zarkh et al. (US 2008/0247621 A1), as applied to Claim 1 above, in further view of in view of Mo (US 6,413,217)***.

Regarding Claim 6, Zarkh et al. (hereinafter Zarkh) discloses a medical viewing system for displaying a sequence of medical images that represents moving and/orpositioning a guide-wire in a blood vessel.

However, Zarkh differs from Claim 6 in that Zarkh does not disclose specifically that second means comprises zooming means for zooming on a region of interest (ROI).

Nonetheless, Mo teaches a live pop zoom mode to zoom in ROI of medical system (col. 2, line 52 – col. 3, line 11).

Accordingly, it would be prima facie obvious to modify the medical viewing system of Zarkh with zooming abilities of Mo so that one could achieve improved image resolution and increased image frame rate.

3. ***Claims 9 and 10 are rejected under 35 USC 103(a) as being obvious over Zarkh et al. (US 2008/0247621 A1), as applied to Claim 1 above, in further view of in view of Webler (US US 2007/0055142 A1).***

Regarding claims 9 and 10, Zarkh et al. (hereinafter Zarkh) discloses a medical viewing system for displaying a sequence of medical images that represents moving and/or positioning a guide-wire in a blood vessel. Zarkh also discusses registering live sequences of processed images with respect to a sequence of corresponding images called peri-interventional images, as discussed in Claim 8. Zarkh also discusses registering images and further registering images with the first registered images, as discussed in rejection of Claim 7 and 8.

However, Zarkh differs from claims 9 and 10 in that Zarkh does not disclose specifically that peri-interventional images are registered in a referential formed by two patient's characteristics (such as breathing characteristic and heart pulse characteristic).

Nonetheless, Webler teaches displaying images of a ROI with a cardiac parameter (electrocardiogram, heart sound, blood pressure, pulse wave, etc) and other physiological parameter (such as respiration rate, or respiration cycle, etc) (pg. [0023] and [0107 – 0108]).

Accordingly, it would be prima facie obvious to modify Zarkh with the teachings of Webler to include association of physiological parameters with images so that one could obtain more accurate and precise tracking of position and orientation of a guide wire in a blood vessel.

Response to Arguments

1. ***Applicant's arguments filed August 26, 2009 have been fully considered but are not persuasive.***

Applicant argues on page 7 of Remarks that Zarkh does not disclose "temporal integration means for averaging pixel intensity over several images for enhancing line-like structures and blurring the background," as claimed in Claim 1.

Examiner respectfully disagrees with Applicant's arguments. Zarkh provides a means for "better discriminate[ing] tubular features like the guidewire tip and vessels, from step-like features such as the boundary of a diaphragm" (*pg. [0050 – 0051)]*.

Applicant argues also on page 7 of Remarks that Zarkh does not disclose "means for delivering diluted contrast agent into the blood vessel over a period of a few minutes."

Examiner respectfully disagrees with Applicant's arguments. Zarkh discusses injecting "contrast material" into the body to assist in navigation of the guidewire. Therefore, it is apparent that Zarkh is injecting *diluted* contrast material as, throughout Zarkh's disclosure, the guidewire is navigated by relying on the *tip* of the guidewire *(pg. [0024] – last sentence; [0025];* ***fig. 2*** *and*

[0029]). Additionally, it would be obvious to one of ordinary skill in the art to modify Zarkh to include automatic means for injecting, since it has been held that broadly providing an automatic means to replace manual activity to accomplish the same result involves only routine skill in the art. See *In re Venner*, 120 USPQ 192.

Applicant's arguments with respect to claims 2 – 4, 6 – 10 and 14 – 17 have been considered but are moot in view of the new ground(s) of rejections and above reasons/explanations.

Conclusion and Communication

Any inquiry concerning this communication or earlier communications from the examiner should be directed to VANI GUPTA whose telephone number is (571)270-5042. The examiner can normally be reached on Monday - Friday (8:30 am - 5:30 pm; EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on 571-272-0823. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/V. G./
Examiner, Art Unit 3768

/Long V Le/
Supervisory Patent Examiner, Art Unit 3768